REMARKS

CLAIM OBJECTIONS

Claims 5, 9, 39 and 43 are objected to based on certain informalities. The typographical error in claim 9 has been corrected. Also, the phrase "a combination thereof" is generally accepted to mean one or more combinations of the before-mentioned items, but in an effort to move this case closer to allowance, the Examiner's suggestion has been entered as an amendment to claims 5, 9, 39 and 43.

35 USC §112

Claims 9 and 43 are rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Applicant respectfully disagrees. Polysiloxanes, as with all polymers, comprise polymer and monomer segments. The compounds that the Examiner cites should be considered part of the polysiloxane and not the polysiloxane as a whole.

35 USC §§102 AND 103

Claims 1-10, 12-20, 25-44, 46-55 and 59-64 are rejected under 35 USC §102(e), as being anticipated by Matayabas (US 6469379). The Applicant respectfully disagrees.

Claim 1 recites:

"A thermal interface composition, comprising:

at least two siloxane-based compounds, wherein each compound has a different solubility parameter,

at least one inorganic micro-filler material, and

at least one thermally conductive filler material."

Claim 35 recites:

"A method of forming a thermal interface material, comprising:

providing at least two siloxane-based compounds, wherein each compound has a different solubility parameter,

providing at least one inorganic micro-filler material,

providing at least one thermally conductive filler material, and

combining the at least two siloxane-based compounds, the at least one inorganic micro-filler material and the at least one thermally conductive filler material."

Matayabas teaches a curable material useful as a thermal interface material comprising at least one vinyl-terminated silicone oil; at least one conductive filler; and at least one hydrogen terminated silicone oil. It is instructive to note that in Column 7 of the reference, lines 55-65, Matayabas states that low molecular weight silicone oil is beneficial to use in conjunction with the high molecular weight silicone polymers. This mixture apparently helps both the crosslinked polymer and the wettability.

In the current application, the Background Section states that:

"Suitable base materials used in GELVET®-type of applications and other similar applications are those materials that are compliant and yet strong, while ideal base materials are those materials that are not only compliant and strong, but also can be produced with a high degree of purity. Silicone is one of the best available polymers identified as a base material because of its compliant property and strength. However, **it is well known that a considerable amount of volatile, low molecular weight components are present inherently as a consequence of the equilibrium polymerization utilized in silicon manufacture. Typically, silicones with viscosity below 50cSt are more than 10% volatile, while those with a viscosity greater than 50cSt are 0.5-4% volatile. After curing, liquid silicone monomers convert into a solid or semi-solid rubbery state polymer and the cross-linked network can then reduce the migration of liquid friction**. Though a certain amount of monomers and oligomers will unavoidably escape out of the bulk base under the harsh burn-in conditions, resulting in an oily organic stain on the surface of IC chips. The contamination not only cosmetically stains the chip surface but also degrades the chip's thermal performance after packaging. **So-called "space-grade" silicone has the least amount of low molecular weight oligomers by repeatedly distillation of industrial grade and accordingly is very expensive.**" (emphasis added)

In the application, as mentioned, a coating material and/or composition has been developed that that a) has a low thermal resistance; b) is relatively free of oil contamination; c) makes a good coating composition; and d) can make a self-assembled physical barrier or interface between the underlying thermal interface material and additional components. Furthermore, the self-assembled

physical barrier is formed inside the coating composition, utilizing a micro-filler and phase separation of two silicone based **macro-monomers**, which will subsequently be crosslinked to form a coating base. The at least two siloxane-based polymers of the current application should have two different solubility parameters. This provision cannot just be assumed to be true in Matayabas, especially since Matayabas doesn't teach that the silicone oils have different solubility parameters or separate into two distinct phases after blending.

Matayabas does not teach all of the claimed elements of the present application. "Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration." *W. L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983) (citing *Soundscriber Corp. v. United States*, 360 F.2d 954, 148 USPQ 298, 301 (Ct. Cl.), *adopted*, 149 USPQ 640 (Ct. Cl. 1966)) Further, the prior art reference must disclose each element of the claimed invention "**arranged as in the claim**". *Lindermann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984)(citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983)). Matayabas teaches the crosslinking of a large and small siloxane oil. The present application teaches utilizing a phase separated siloxane composition that can be crosslinked to form, among other things, a protective barrier. These two disclosures are not the same, and certainly Matayabas cannot anticipate claim 1 or claim 35 of the present application. In addition, claims 2-10, 12-20, 25-34, 36-44, 46-55 and 59-64 are allowable by virtue of their dependency on claims 1 and 35, respectively.

Claims 1-14, 16, 18-20, 22-23, 25-48, 50, 52-57 and 59-64 are rejected under 35 USC §102(b), as being anticipated by Mine et al (US 6040362). The Applicant respectfully disagrees.

Claim 1 recites:

"A thermal interface composition, comprising:

at least two siloxane-based compounds, wherein each compound has a different solubility parameter,

at least one inorganic micro-filler material, and

at least one thermally conductive filler material."

Claim 35 recites:

"A method of forming a thermal interface material, comprising:

providing at least two siloxane-based compounds, wherein each compound has a different solubility parameter,

providing at least one inorganic micro-filler material,

providing at least one thermally conductive filler material, and

combining the at least two siloxane-based compounds, the at least one inorganic micro-filler material and the at least one thermally conductive filler material."

Mine et al. does not anticipate the claims of the present application, because Mine does not recite at least two siloxane-based compounds, wherein each compound has a different solubility parameter. Anticipation generally requires the disclosure in a single prior art reference of each element of the claim under consideration. Further, the prior art reference must disclose each element of the claimed invention arranged as in the claim. Mine does not teach a thermal interface material

or a method of making a thermal interface material comprising at least two siloxane-based compounds, wherein each compound has a different solubility parameter.

Although the Examiner contends that he has a "reasonable basis" to believe that the compounds disclosed in Mine have different solubility parameters, there is no evidence in Mine to suggest that the inventors in Mine dealt with or intended for a phase separation to take place between the components. In the present application, that phase separation is specifically required. The Examiner is going to need to specifically show where in Mine the inventors have a phase separated composition comprising the two components or at the very least suggest that the option is possible.

Based on this argument, Mine does not anticipate claims 1 or 35 of the present application because Mine is lacking and/or missing at least one specific feature or structural recitation found in the present application, and in claims 1 and 35. Claims 1 and 35 are therefore allowable as not being anticipated by Mine. Further, Mine does not anticipate claims 2-14, 16, 18-20, 22-23, 25-34, 36-48, 50, 52-57 and 59-64 of the present application by virtue of their dependency on claims 1 and 35, respectively.

Claims 1-15, 17-26, 35-49 and 51-60 are rejected under 35 USC §102(b), as being anticipated by Theodore (US 4292225). The Applicant respectfully disagrees.

Claim 1 recites:

"A thermal interface composition, comprising:

at least two siloxane-based compounds, wherein each compound has a different solubility parameter,

at least one inorganic micro-filler material, and

at least one thermally conductive filler material."

Claim 35 recites:

"A method of forming a thermal interface material, comprising:

providing at least two siloxane-based compounds, wherein each compound has a different solubility parameter,

providing at least one inorganic micro-filler material,

providing at least one thermally conductive filler material, and

combining the at least two siloxane-based compounds, the at least one inorganic micro-filler material and the at least one thermally conductive filler material."

Theodore et al. does not anticipate the claims of the present application, because Theodore does not recite at least two siloxane-based compounds, wherein each compound has a different solubility parameter. Anticipation generally requires the disclosure in a single prior art reference of

each element of the claim under consideration. Further, the prior art reference must disclose each element of the claimed invention arranged as in the claim. Theodore does not teach a thermal interface material or a method of making a thermal interface material comprising at least two siloxane-based compounds, wherein each compound has a different solubility parameter.

Although the Examiner contends that he has a "reasonable basis" to believe that the compounds disclosed in Theodore have different solubility parameters, there is no evidence in Theodore to suggest that the inventors in Theodore dealt with or intended for a phase separation to take place between the components. In the present application, that phase separation is specifically required. The Examiner is going to need to specifically show where in Theodore the inventors have a phase separated composition comprising the two components or at the very least suggest that the option is possible.

Based on this argument, Theodore does not anticipate claims 1 or 35 of the present application because Theodore is lacking and/or missing at least one specific feature or structural recitation found in the present application, and in claims 1 and 35. Claims 1 and 35 are therefore allowable as not being anticipated by Theodore. Further, Theodore does not anticipate claims 2-15, 17-26, 36-49 and 51-60 of the present application by virtue of their dependency on claims 1 and 35, respectively.

Claims 1-5, 8-10, 12-15, 17-18, 25-39, 43-44, 46-49, 51-52 and 59-64 are rejected under 35 USC §102(b), as being anticipated by Hanson (US 5950066). The Applicant respectfully disagrees.

Claim 1 recites:

"A thermal interface composition, comprising:

at least two siloxane-based compounds, wherein each compound has a different solubility parameter,

at least one inorganic micro-filler material, and

at least one thermally conductive filler material."

Claim 35 recites:

"A method of forming a thermal interface material, comprising:

providing at least two siloxane-based compounds, wherein each compound has a different solubility parameter,

providing at least one inorganic micro-filler material,

providing at least one thermally conductive filler material, and

combining the at least two siloxane-based compounds, the at least one inorganic micro-filler material and the at least one thermally conductive filler material."

Hanson does not anticipate the claims of the present application, because Hanson does not recite at least two siloxane-based compounds, wherein each compound has a different solubility parameter. Anticipation generally requires the disclosure in a single prior art reference of each

element of the claim under consideration. Further, the prior art reference must disclose each element of the claimed invention arranged as in the claim. Theodore does not teach a thermal interface material or a method of making a thermal interface material comprising at least two siloxane-based compounds, wherein each compound has a different solubility parameter.

Although the Examiner contends that he has a "reasonable basis" to believe that the compounds disclosed in Hanson have different solubility parameters, there is no evidence in Hanson to suggest that the inventors in Hanson dealt with or intended for a phase separation to take place between the components. In the present application, that phase separation is specifically required. The Examiner is going to need to specifically show where in Hanson the inventors have a phase separated composition comprising the two components or at the very least suggest that the option is possible.

Based on this argument, Hanson does not anticipate claims 1 or 35 of the present application because Hanson is lacking and/or missing at least one specific feature or structural recitation found in the present application, and in claims 1 and 35. Claims 1 and 35 are therefore allowable as not being anticipated by Hanson. Further, Hanson does not anticipate claims 2-5, 8-10, 12-15, 17-18, 25-34, 36-39, 43-44, 46-49, 51-52 and 59-64 of the present application by virtue of their dependency on claims 1 and 35, respectively.

Claims 16, 21-22, 24, 50, 55-56 and 58 are rejected under 35 USC §103(a) in view of the references cited above – alone or in combination with one another.

Procedurally, these rejections are inappropriate for two reasons. First, all of the claims cited in the 103(a) rejections are dependent claims. Independent claims 1 and 35 are not cited as being obvious in view of these references – and therefore, they are allowable. Since they are allowable, the dependant claims to which they refer are also allowable. Second, claims are not obvious in view of only one reference, but instead in view of a combination of references. If there is only one reference cited, it should properly be cited as a reference which anticipates the claims cited and not renders

obvious those same claims.

In order to expedite prosecution of this application, however, the Applicants will address the references. In the current application, the Background Section states that:

"Suitable base materials used in GELVET®-type of applications and other similar applications are those materials that are compliant and yet strong, while ideal base materials are those materials that are not only compliant and strong, but also can be produced with a high degree of purity. Silicone is one of the best available polymers identified as a base material because of its compliant property and strength. However, **it is well known that a considerable amount of volatile, low molecular weight components are present inherently as a consequence of the equilibrium polymerization utilized in silicon manufacture. Typically, silicones with viscosity below 50cSt are more than 10% volatile, while those with a viscosity greater than 50cSt are 0.5-4% volatile. After curing, liquid silicone monomers convert into a solid or semi-solid rubbery state polymer and the cross-linked network can then reduce the migration of liquid friction**. Though a certain amount of monomers and oligomers will unavoidably escape out of the bulk base under the harsh burn-in conditions, resulting in an oily organic stain on the surface of IC chips. The contamination not only cosmetically stains the chip surface but also degrades the chip's thermal performance after packaging. **So-called "space-grade" silicone has the least amount of low molecular weight oligomers by repeatedly distillation of industrial grade and accordingly is very expensive.**" (emphasis added)

In the application, as mentioned, a coating material and/or composition has been developed that that a) has a low thermal resistance; b) is relatively free of oil contamination; c) makes a good coating composition; and d) can make a self-assembled physical barrier or interface between the underlying thermal interface material and additional components. Furthermore, the self-assembled physical barrier is formed inside the coating composition, utilizing a micro-filler and phase separation of two silicone based **macro-monomers**, which will subsequently be crosslinked to form a coating base. The at least two siloxane-based polymers of the current application should have two different solubility parameters. The two solubility paraameters allow the at least two siloxane-based

polymers to separate into two distinct phases before the crosslinking reaction takes place. None of the cited references teach this phase separation, despite what the Examiner reasonably believes about the compounds taught in those references. In addition, one of ordinary skill in the art will not read any of the cited references and come away with the knowledge that utilizing different solubility parameters to form two distinct phases will be desirable for a thermal interface material.

Therefore, claims 1 and 35 are patentable over Matayabas, Mine, Hanson and combinations thereof. In addition, claims 16, 21-22, 24, 50, 55-56 and 58 are allowable as being dependant on allowable claims 1 and 35.

REQUEST FOR ALLOWANCE

Claims 1-64 are pending in this application, and the Applicant respectfully requests that the Examiner reconsider all of the claims in light of the arguments presented and allow all current and pending claims.

Respectfully submitted,

Buchalter Nemer, A Professional Corporation

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By: Sandra Thompson

Sandra P. Thompson, PhD, Esq.
Reg. No. 46,264
E-mail: sthompson@buchalter.com
Direct Line: 949-224-6282

ATTORNEYS FOR APPLICANT(S):
18400 Von Karman Ave., Suite 800
Irvine, CA 92612
Tel: 949-224-6282
Fax: 949-224-6203